



2008 NIOSH Direct-Reading Exposure Assessment Methods (DREAM) Workshop

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Rapporteur Report

Hazard Session: Ergonomics and Vibration

Monitor: Brian Lowe

National Institute for Occupational Safety & Health

Co-Monitor: Rob Radwin

University of Wisconsin

Rapporteur: Vern Anderson

National Institute for Occupational Safety & Health



Participants

Valerie Beck

Rebecca Bell

Frank Buczek

Linda Byrnes

Steven Chervak

Patrick Dempsey

Sunwook Kim

Brian Lowe

Raymond McGorry

Dinkar Mokadam

Gail Murphy

Vern Putz Anderson

Robert Radwin

Scott Robbins

Brian Roethlisberger

Thomas Waters

Daniel Welcome

Mike Wurm

Daniel Youhas





Importance of DRM for MSDs in Sectors

- National Academy of Sciences NRC/IOM 2001 Panel on Musculoskeletal Disorders in the Workplace
RESEARCH AGENDA - METHODOLOGICAL RESEARCH
 1. Develop improved tools for exposure (dose) assessment.
“Develop practical and consistent methods for objectively measuring physical stress (force, motion, vibration, and temperature) in the workplace and for quantifying occupational exposure (magnitude, repetition, and duration) with sufficient precision and accuracy.”
- All 8 industry sectors have identified MSDs in their strategic goals (#1 or #2)
 - May be sector-specific environmental constraints



Working Definition

“These instruments provide objective *field-based* measurement of exposures (*force, motion, vibration and temperature*) that provide a method that indicates whether or not the exposures pose an occupational health or safety risk and if the *interventions* employed are actually providing the proper level of protection.”



Unique Challenges of MSDs for DRM

- Exposure is the worker's mechanical interaction with workplace and tools (i.e. forces and motions)
- Hazard lies in the physical demands of the work
- Exposure measurement is indirect (chemical/physical agent model is not directly applicable)



Exposure Assessment for MSDs

- Job titles
- Checklists
- Observational-Based Analysis
- Biomechanical Modelling
- Instrumentation-Based Methods (limited)
 - Electrogoniometer (joint position)
 - Electromyography (muscle electrical activity)
 - Accelerometry
 - Force sensors
 - Video Exposure Monitoring



Top Research Priorities

- 1) Assess specific needs of customers for DRM
(research-based vs. practitioner vs. worker)
- 2) Develop technologies to measure exposure dose
- 3) Investigate pathophysiological processes associated
with exposures
- 4) Establish valid exposure assessment criteria
(exposure limits)
- 5) Translate research into practical instruments for DRM

Attributes of Exposure Assessment

	Researcher	Practitioner	Worker
Reasonable cost	low priority	high priority	
Accurate	high priority	medium priority	
Unobtrusiveness	low priority	medium priority	
Real time			
Force and posture			
Repetition (frequency) magnitude			
Reliable			

Top Research Priorities

- **Assess researcher v. practitioner v. worker needs for DREAM in ergonomics**
 - On-site measurement (field)
 - Direct reading
 - Field measurement v. lab measurement
- **Need for technology to measure exposure (dose)**
 - Kinetics (force), kinematics (motion), vibration and cold
 - Repetition (frequency), magnitude, and duration
- **Understand pathophysiological processes associated with exposures**
 - Physiological responses to exposure (bio-monitoring)
 - Health monitoring instruments
- **Need for exposure assessment criteria**
 - Dose-response relationship
 - Inform decision making to prevent MSDs
 - Evaluate intervention effectiveness
 - Display and dissemination of information
- **Instruments for measurement and exposure assessment**
 - Measurement characteristics
 - Accurate
 - Reliable
 - Objective measurement and assessment procedure
 - Relationship to physical work
 - Usability of instruments
 - Manufacturability
 - Ruggedized
 - Worker and management acceptance
 - Reasonable cost
 - Training analyst and user
 - Speed of assessment
 - Real time
 - Unobtrusive